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THE CHINESE UNIVERSITY OF HONG KONG

Department of Information Engineering

Seminar

Efficient Information Dissemination of 3D Mapping Data for Autonomous Vehicles

by

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The Chinese University of Hong Kong

Abstract

Information exchanges play a vital role in enabling autonomous driving by overcoming the limitation of perception and decision of a single autonomous vehicle. For assuring safety, facilitating regulations, and enhancing intelligent decisions, it is critical to enable a detailed global view of mapping data (that describes the road environments and roadside objects) to be synchronized and exchanged dynamically among autonomous vehicles, roadside infrastructure, and traffic control center. Central to autonomous driving is the mapping data in form of 3D point cloud that is commonly utilized by LIDAR (laser-based) perception systems, which can accurately represent physical objects in 3D space, but usually takes up a large volume of data. Therefore, the efficiency of 3D point cloud mapping data dissemination is crucial to practical realization of autonomous driving. In this paper, we present 3D-MADS, an efficient information dissemination system of 3D point cloud mapping data for autonomous vehicles, roadside units and a mapping data repository, considering heterogeneous transmission options, such as cellular network unicast and short-range local broadcast transmissions. We provide a system of solutions to optimize the performance of 3D point cloud mapping data dissemination, including hashing 3D point cloud data by Bloom filters, index coding at roadside units, and opportunistic scheduling of heterogeneous transmissions. We empirically evaluated our system using real-world mobility data traces of vehicles and 3D point cloud data of city streets. We also implemented our system in a multi-robotic vehicle testbed for practical evaluation.

Biography

Ivan Wang-Hei Ho is currently a Research Assistant Professor at the Department of Electronic and Information Engineering, The Hong Kong Polytechnic University. He received the B.Eng. and M.Phil. degrees in Information Engineering from The Chinese University of Hong Kong, and the Ph.D. degree in Electrical and Electronic Engineering from Imperial College London, UK. He worked on the MESSAGE project funded by EPSRC and Department for Transport, UK, and the ITA project funded by the US Army Research Laboratory and UK Ministry of Defence during his Ph.D. studies. In 2007, Ivan spent a summer working at the IBM T. J. Watson Research Center, Hawthorne, NY, USA. After his Ph.D. graduation, he was with the System Engineering Initiative at Imperial College as a Postdoctoral Research Associate. In Sept 2010, he co-founded P2 Mobile Technologies Limited at Hong Kong Science Park and served as the Chief R&D Engineer. He primarily invented the MeshRanger series wireless mesh embedded system, which won the Silver Award in Best Ubiquitous Networking at the Hong Kong ICT Awards 2012. Ivan is an Associate Editor for IEEE Access and IEEE Transactions on Circuits and Systems II, and TPC member for IEEE conferences (ICC, WCNC, PIMRC, etc.). His research interests are in wireless communications and networking, specifically in vehicular networks, intelligent transportation systems, and Internet of things.

**** ALL ARE WELCOME ****

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